

Docket No. 239932US2/shb



2852

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Tohru KANNO

SERIAL NO: 10/613,998

GAU: 2852

FILED: July 8, 2003

EXAMINER:

FOR: DOCUMENT READING APPARATUS AND IMAGING APPARATUS IMPLEMENTING SAME

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☒ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☒ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the patent(s), together with a copy of the claims and drawings of the pending application(s) is attached along with PTO 1449.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

- ☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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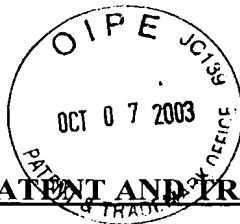
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IMPLEMENTING SAME

STATEMENT OF RELEVANCY

References AO (JP 10-285338) and AP (JP 2001-273996) on Form 1449 are discussed in the specification.

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Form PTO 1449 (Modified)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY DOCKET NO. 239932US2		SERIAL NO. 10/613,998	
LIST OF REFERENCES CITED BY APPLICANT				APPLICANT Tohru KANNO			
				FILING DATE July 8, 2003		GROUP 2852	
U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	AA	5,408,113	04/18/95	T. KANNO, et al.			
	AB	6,426,804	07/30/2002	T. KANNO, et al.			
	AC	6,198,349	03/06/2001	T. KANNO, et al.			
	AD	6,564,028	05/13/2003	T. KANNO			
	AE	6,606,046	08/12/2003	T. KANNO			
	AF						
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	AH						
	AI						
	AJ						
	AK						
	AL						
	AM						
	AN						
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	TRANSLATION YES NO		
	AO	10-285338	10/23/98	JAPAN (with English Abstract)			X
	AP	2001-273996	10/05/2001	JAPAN (with English Abstract)			X
	AQ						
	AR						
	AS						
	AT						
	AU						
	AV						
OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, etc.)							
	AW						
	AX						
	AY						
	AZ					<input type="checkbox"/> Additional References sheet(s) attached	
Examiner					Date Considered		
*Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							



LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
0557-3044-2X	5,408,113	04/18/95	KANNO et al.
0557-4348-2	6,426,804	07/30/02	KANNO et al.
0557-4605-2	6,198,349	03/06/01	KANNO et al.
204571US2	09/816,220	03/26/01	KANNO
211330US2	6,564,028	05/13/03	KANNO
220636US2	6,606,046	08/12/03	KANNO
228082US3	10/238,769	09/11/02	TAKAHASHI et al.
230707US2	10/299,718	11/20/02	NISHIKINO et al.
239932US2*	10/613,998	07/08/03	KANNO

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*Present Application; listed for information

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CLAIMS:

1. An image processing apparatus, comprising:

a scanner including a direct control section configured to control a scanning
5 operation of the scanner so as to input image information from an original document; and
a main body configured to process the image information, and including a control
section configured to perform an initializing process for the main body,

wherein a homing operation of the scanner is performed by the direct control
section independently of the initializing process of the control section of the main body,
10 when power is supplied to the image processing apparatus or when the image processing
apparatus is returned from a shutdown state.

2. An image processing apparatus, comprising:

a scanner including a direct control section configured to control a scanning
15 operation of the scanner so as to input image information from an original document;
an image input device other than said scanner configured to input image
information;

a main body configured to process the image information input by the scanner and
the image input device, said main body including a control section configured to perform
20 an initializing process for said main body; and

an operation device configured to determine whether a homing operation of said
scanner is performed by the direct control section independently of the initializing process
of the control section of the main body or by an instruction provided from the control
section of the main body, when power is supplied to the image processing apparatus or
25 when the image processing apparatus is returned from a shutdown state.

3. An image processing apparatus having a plurality of functions, comprising:

a scanner including a direct control section configured to control a scanning
operation of the scanner so as to input image information from an original document;

30 an image input device other than said scanner configured to input image
information;

a main body configured to process the image information input by said scanner

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and said image input device, said main body including a control section configured to perform an initializing process for said main body; and

an operational mode selection device configured to select one of a first operational mode in which a homing operation of the scanner is performed by the direct control section independently of the initializing process of the control section of the main body, and a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the control section of the main body, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state,

wherein said operational mode selection device selects the first operational mode when each of the plurality of functions is fulfilled with said scanner, and selects the second operational mode when at least one of the plurality of functions is fulfilled without the scanner.

4. The image processing apparatus according to claim 3, wherein the operational mode selection device includes a volatile memory configured to store data, detected by the control section of the main body, on the plurality of functions of the image processing apparatus, and

wherein the operational mode selection device selects the first or second operational modes based on the data stored in the volatile memory.

5. An image processing apparatus having a plurality of functions, comprising:

a scanner including a direct control section configured to control a scanning operation of the scanner so as to input image information from an original document;

an image input device other than said scanner configured to input image information;

a main body configured to process the image information input by said scanner and said image input device, said main body including a control section configured to perform an initialization process for said main body; and

an operational mode selection device configured to select one of a first operational mode in which a homing operation of the scanner is performed by the direct control section independently of the initializing process of the control section of the main body, and a

second operational mode in which the homing operation of the scanner is performed by an instruction provided from the control section of the main body, said operational mode selection device including a volatile memory configured to store data, detected by the control section of the main body, on the plurality of functions of the image processing apparatus,

wherein the operational mode selection device selects the first operational mode when each of the plurality of functions is fulfilled with said scanner when the image processing apparatus is returned from a shutdown state, and selects the second operational mode when power is supplied to the image processing apparatus, and

wherein the operational mode selection device selects the second operational mode when the data stored in the volatile memory includes at least one of the plurality of functions fulfilled without the scanner when the image processing apparatus is returned from a shutdown state.

6. The image processing apparatus according to claim 3, wherein the plurality of functions comprise at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

7. The image processing apparatus according to claim 5, wherein the plurality of functions comprise at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

8. A method for initializing an image processing apparatus having a main body for processing image information input by a scanner, comprising:

performing a homing operation of the scanner independently of an initializing process of the main body, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state.

9. A method for initializing an image processing apparatus having a main body for processing image information input by a scanner, comprising:

selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing

process of the main body or a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the main body.

10. A method for initializing an image processing apparatus having a plurality of functions and a main body for processing image information input by a scanner or another image input device, comprising:

detecting a plurality of functions included in the image processing apparatus; and

selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing process of the main body when each of the plurality of functions is fulfilled with the scanner or selecting a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the main body when at least one of the plurality of functions is fulfilled without said scanner.

11. The method according to claim 10, further comprising:

storing, in a volatile memory, data corresponding to the plurality of functions detected in the detecting step; and

selecting the operational mode based on the data stored in the volatile memory.

12. A method for initializing an image processing apparatus having a plurality of functions and a main body for processing image information input by a scanner or another image input device, comprising:

detecting a plurality of functions included in the image processing apparatus;

storing, in a volatile memory, data corresponding to the plurality of functions

detected in the detecting step; and

selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing process of the main body when each of the plurality of functions stored in the volatile memory is fulfilled with said scanner when the image processing apparatus is returned from a shutdown state, or selecting a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the main body when power is supplied to the image processing apparatus and when at least one of the plurality

of functions stored in the volatile memory is fulfilled without said scanner when the image processing apparatus is returned from the shutdown state.

13. The method according to claim 10, wherein the plurality of functions include at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

14. The method according to claim 12, wherein the plurality of functions include at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

15. An image processing apparatus, comprising:

scanner means including a direct control section for controlling a scanning operation of the scanner means so as to input image information from an original document; and

main body means for processing the image information, and including a control section for performing an initializing process of the main body means,

wherein a homing operation of the scanner means is performed by the direct control section independently of the initializing process of the control section of the main body means, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state.

16. An image processing apparatus, comprising:

scanner means including a direct control section for controlling a scanning operation of the scanner means so as to input image information from an original document;

image input means other than said scanner means for inputting image information;

main body means for processing the image information input by the scanner means and the image input means, said main body means including a control section for performing an initializing process of said main body means; and

operational means for determining whether a homing operation of said scanner means is performed by the direct control section independently of the initializing process

of the control section of the main body means or by an instruction provided from the control section of the main body means when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state.

5 17. An image processing apparatus having a plurality of functions, comprising:
scanner means including a direct control section for controlling a scanning operation of the scanner means so as to input image information from an original document;

image input means other than said scanner means for inputting image information;
10 main body means for processing the image information input by said scanner means and said image input means, said main body means including a control section for performing an initializing process of said main body; and

operational mode selection means for selecting one of a first operational mode in which a homing operation of the scanner means is performed by the direct control section
15 independently of the initializing process of the control section of the main body means, and a second operational mode in which the homing operation of the scanner means is performed by an instruction provided from the control section of the main body means, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state,

20 wherein said operational mode selection means selects the first operational mode when each of the plurality of functions is fulfilled with said scanner means, and selects the second operational mode when at least one of the plurality of functions is fulfilled without the scanner means.

25 18. The image processing apparatus according to claim 17, wherein the operational mode selection means includes memory means for storing data, detected by the control section of the main body means on the plurality of functions of the image processing apparatus, and

wherein the operational mode selection means selects the first or second
30 operational modes based on the data stored in the memory means.

19. An image processing apparatus having a plurality of functions, comprising:

scanner means including a direct control section for controlling a scanning operation of the scanner means so as to input image information from an original document;

image input means other than said scanner means for inputting image information;

5 main body means for processing the image information input by said scanner means and said image input means, said main body means including a control section for performing an initialization process of said main body means; and

operational mode selection means for selecting one of a first operational mode in which a homing operation of the scanner means is performed by the direct control section
10 independently of the initializing process of the control section of the main body means, and a second operational mode in which the homing operation of the scanner means is performed by an instruction provided from the control section of the main body, said operational mode selection device including memory means for storing data, detected by the control section of the main body means, on the plurality of functions of the image
15 processing apparatus,

wherein the operational mode selection means selects the first operational mode when each of the plurality of functions is fulfilled with said scanner means when the image processing apparatus is returned from a shutdown state, and selects the second operational mode when power is supplied to the image processing apparatus, and

20 wherein the operational mode selection means selects the second operational mode when the data stored in the memory means includes at least one of the plurality of functions fulfilled without the scanner means when the image processing apparatus is returned from a shutdown state.

25 20. The image processing apparatus according to claim 17, wherein the plurality of functions comprise at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

30 21. The image processing apparatus according to claim 19, wherein the plurality of functions comprise at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

22. A computer program product for initializing an image processing apparatus having a main body for processing image information input by a scanner, comprising:

a first computer code for performing a homing operation of the scanner independently of an initializing process of the main body, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state.

23. A computer program product for initializing an image processing apparatus having a main body for processing image information input by a scanner, comprising:

a first computer code for selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing process of the main body or a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the main body.

24. A computer program product for initializing an image processing apparatus having a plurality of functions and a main body for processing image information input by a scanner or another image input device, comprising:

a first computer code for detecting a plurality of functions included in the image processing apparatus; and

a second computer code for selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing process of the main body when each of the plurality of functions is fulfilled with the scanner or selecting a second operational mode in which the homing operation of the scanner is performed by an instruction provided from the main body when at least one of the plurality of functions is fulfilled without said scanner.

25. The computer program product according to claim 24, further comprising:

a third computer code for storing, in a volatile memory, data corresponding to the plurality of functions detected by the first computer code; and

a fourth computer code for selecting the operational mode based on the data stored in the volatile memory.

26. A computer program product for initializing an image processing apparatus having a plurality of functions and a main body for processing image information input by a scanner or another image input device, comprising:

5 a first computer code for detecting a plurality of functions included in the image processing apparatus;

a second computer code for storing, in a volatile memory, data corresponding to the plurality of functions detected by the first computer code; and

10 a third computer code for selecting a first operational mode in which a homing operation of the scanner is performed by a direct control section of the scanner independently of an initializing process of the main body when each of the plurality of functions stored in the volatile memory is fulfilled with said scanner when the image processing apparatus is returned from a shutdown state, or selecting a second operational mode in which the homing operation of the scanner is performed by an instruction
15 provided from the main body when power is supplied to the image processing apparatus and when at least one of the plurality of functions stored in the volatile memory is fulfilled without said scanner when the image processing apparatus is returned from the shutdown state.

20 27. The computer program product according to claim 24, wherein the plurality of functions include at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

25 28. The computer program product according to claim 26, wherein the plurality of functions include at least one of a facsimile function, a printer function, and a filing function in addition to a copying function.

ABSTRACT OF THE DISCLOSURE

An image processing apparatus including a scanner with a direct control section configured to control a scanning operation of the scanner so as to input image information from an original document and a main body configured to process the image information. The main body includes a control section configured to perform an initializing process for the main body. Further, a homing operation of the scanner is performed by the direct control section independently of the initializing process of the control section of the main body, when power is supplied to the image processing apparatus or when the image processing apparatus is returned from a shutdown state.

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FIG. 1

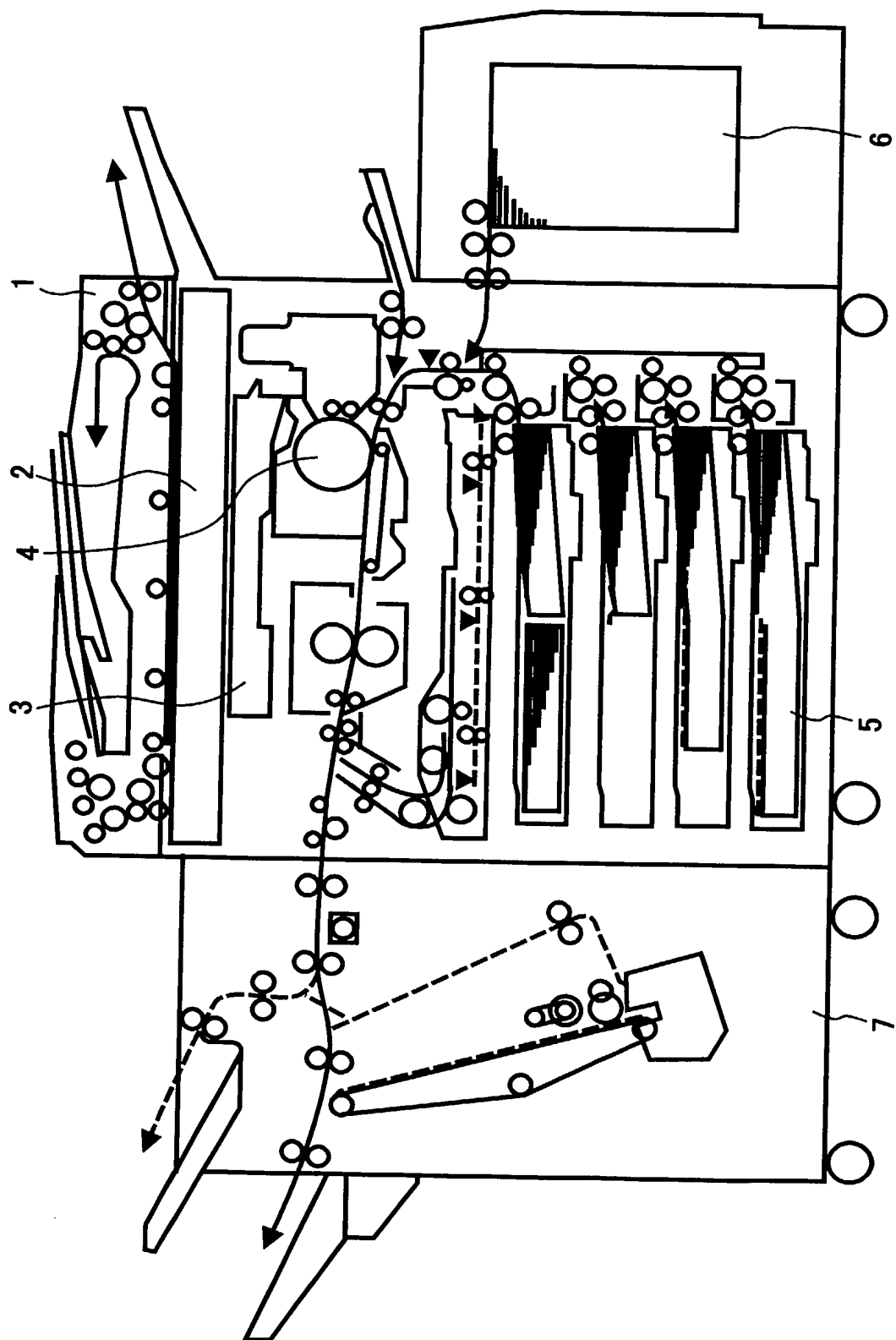


FIG. 2

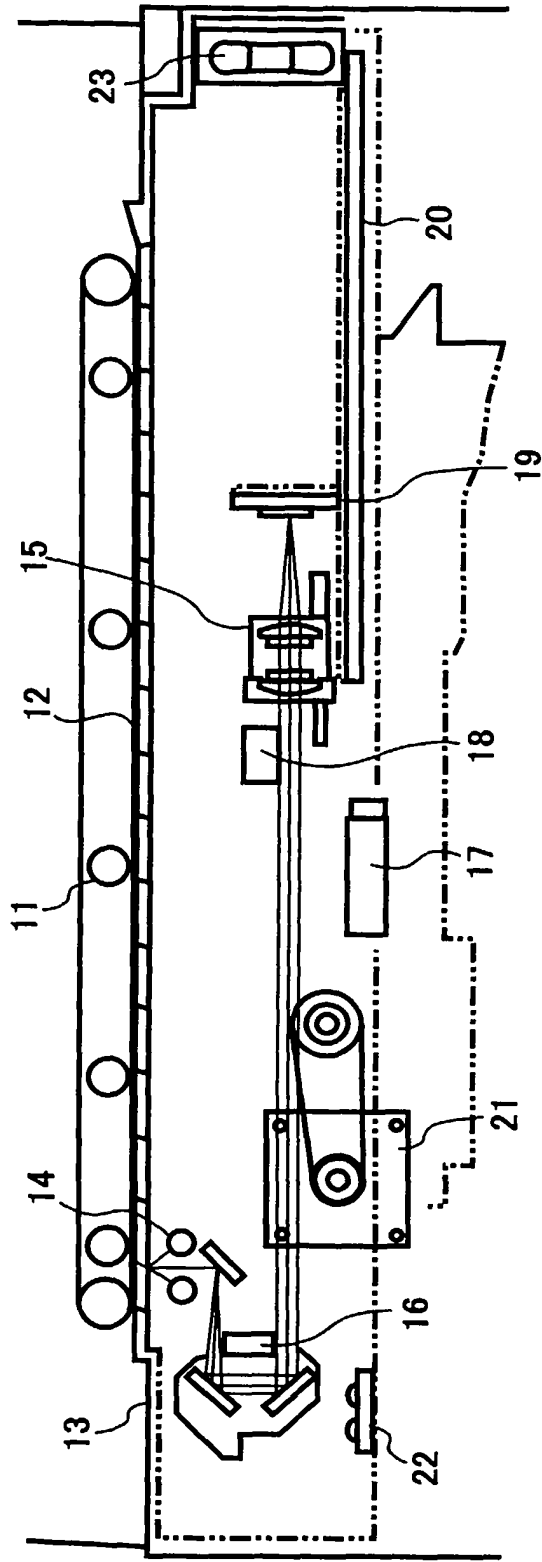


FIG. 3

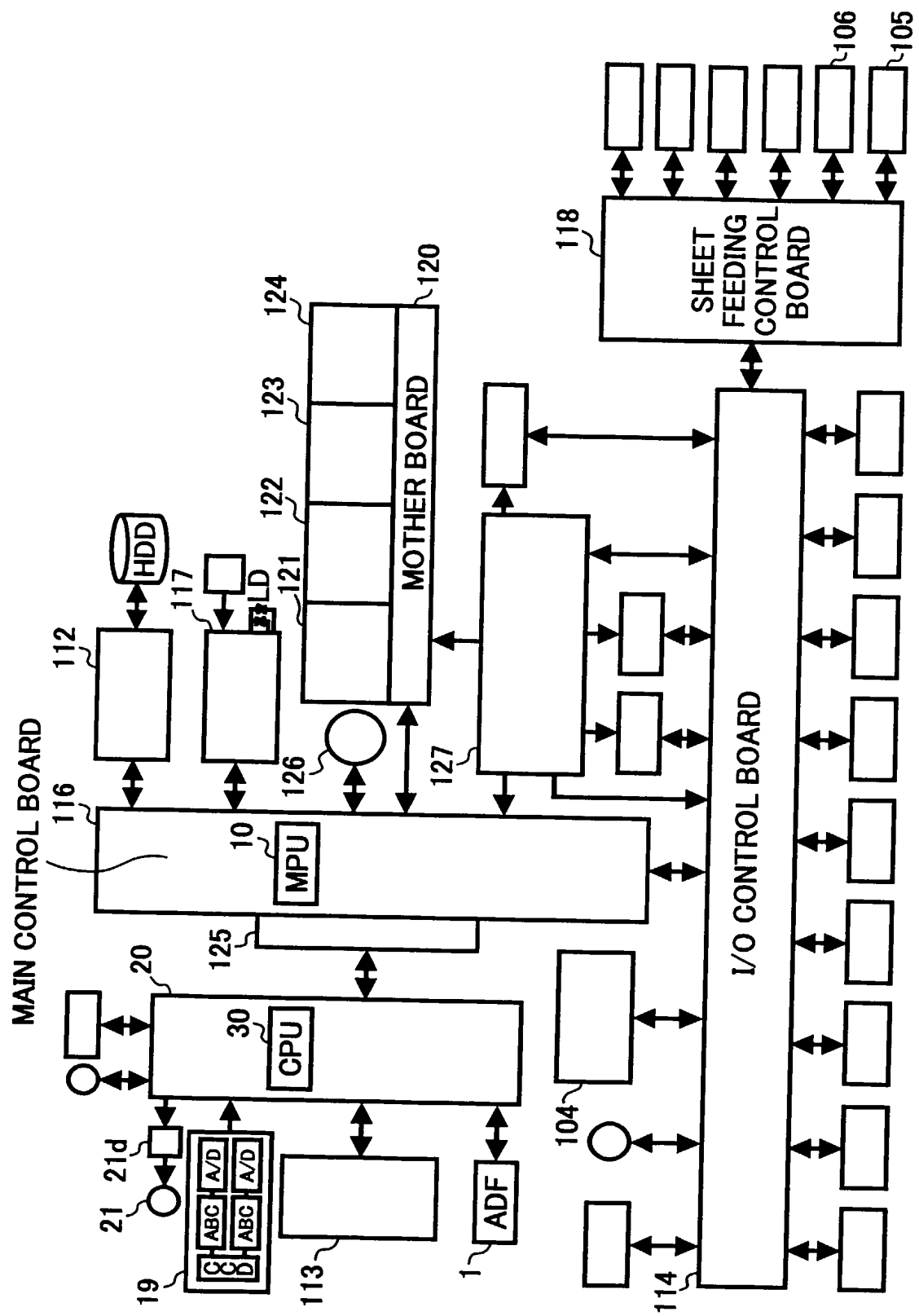


FIG. 4

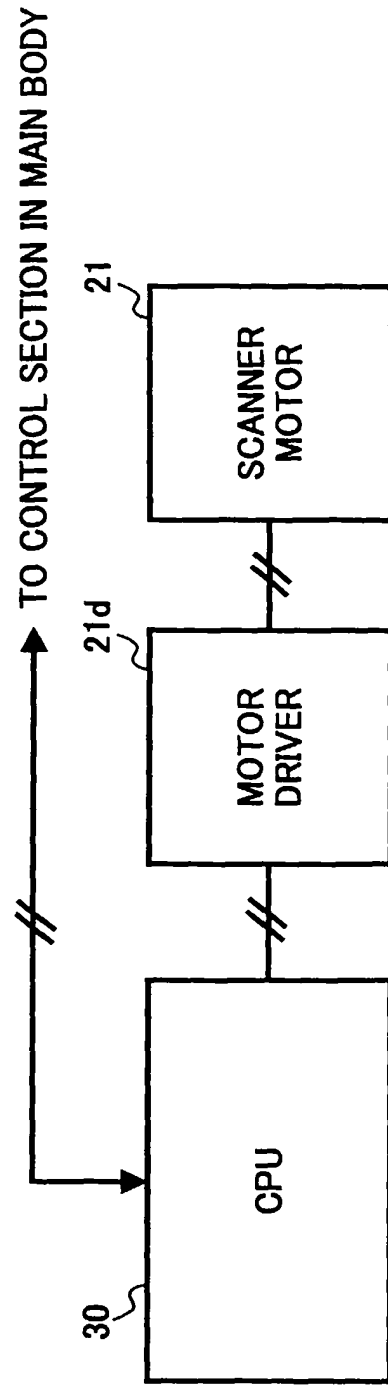


FIG. 5

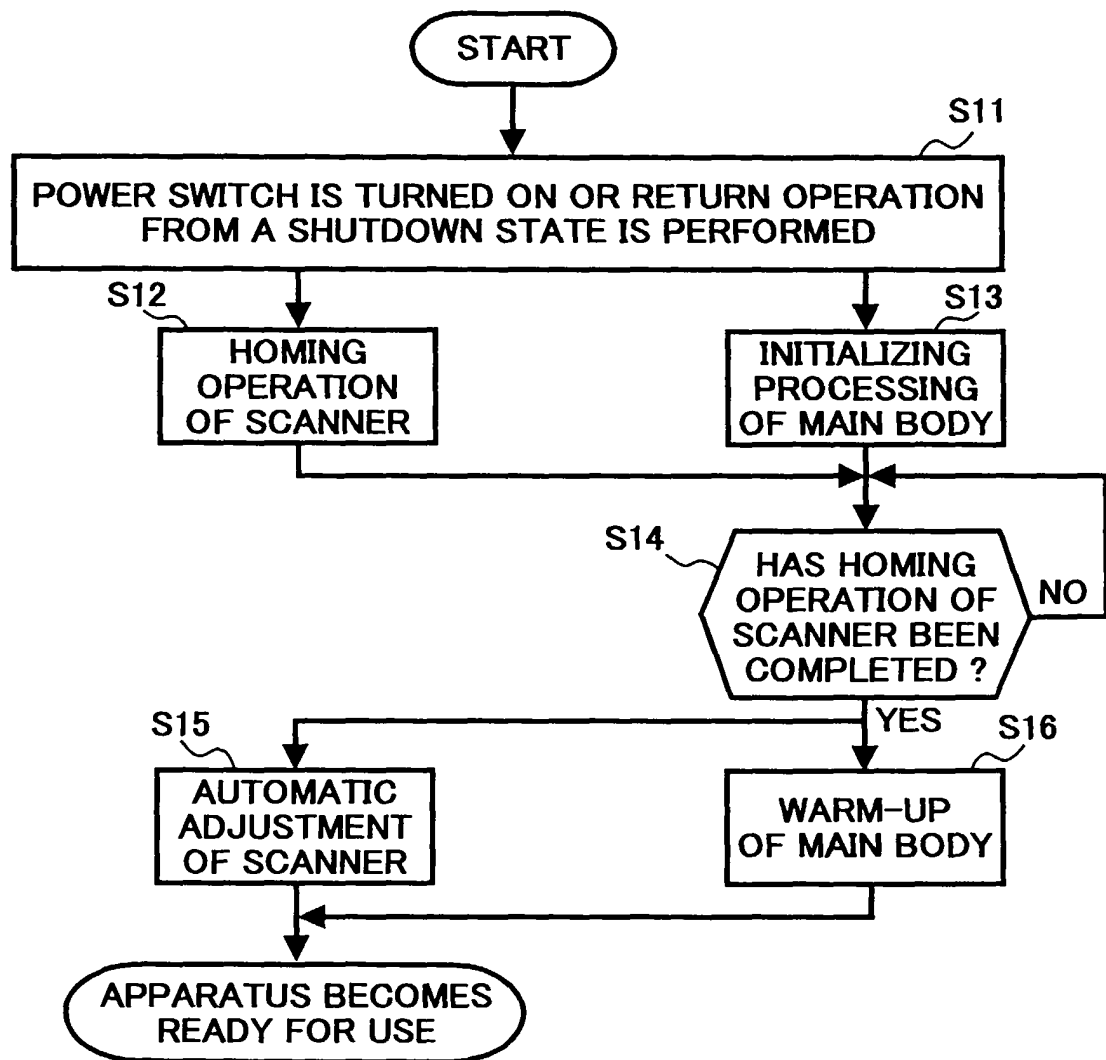


FIG. 6

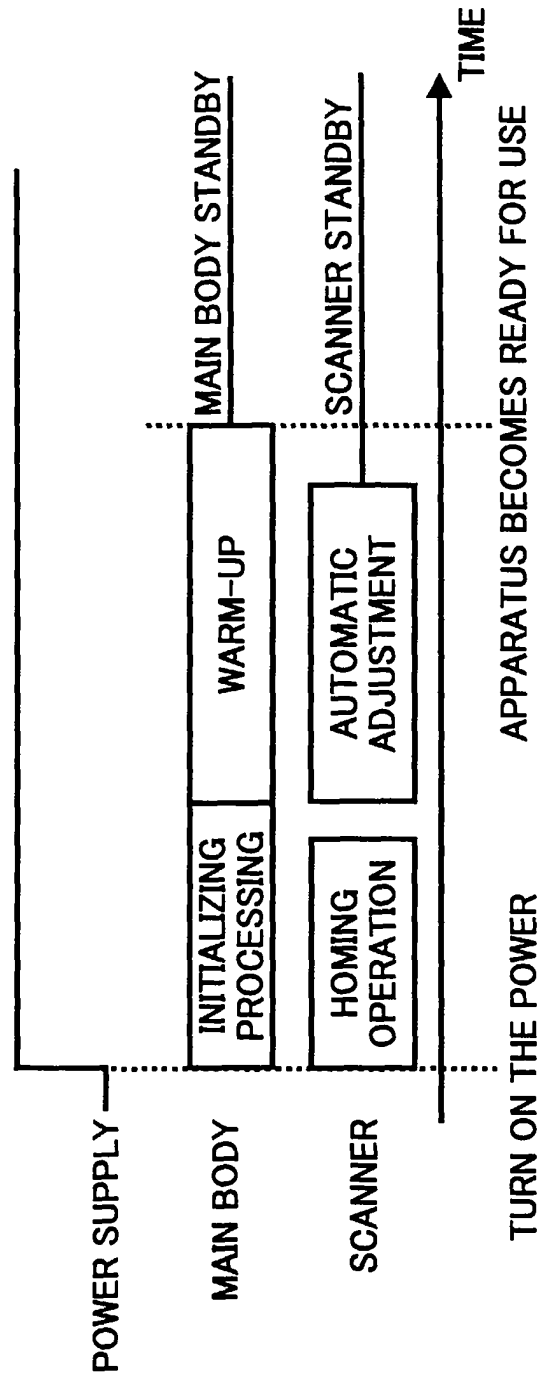


FIG. 7

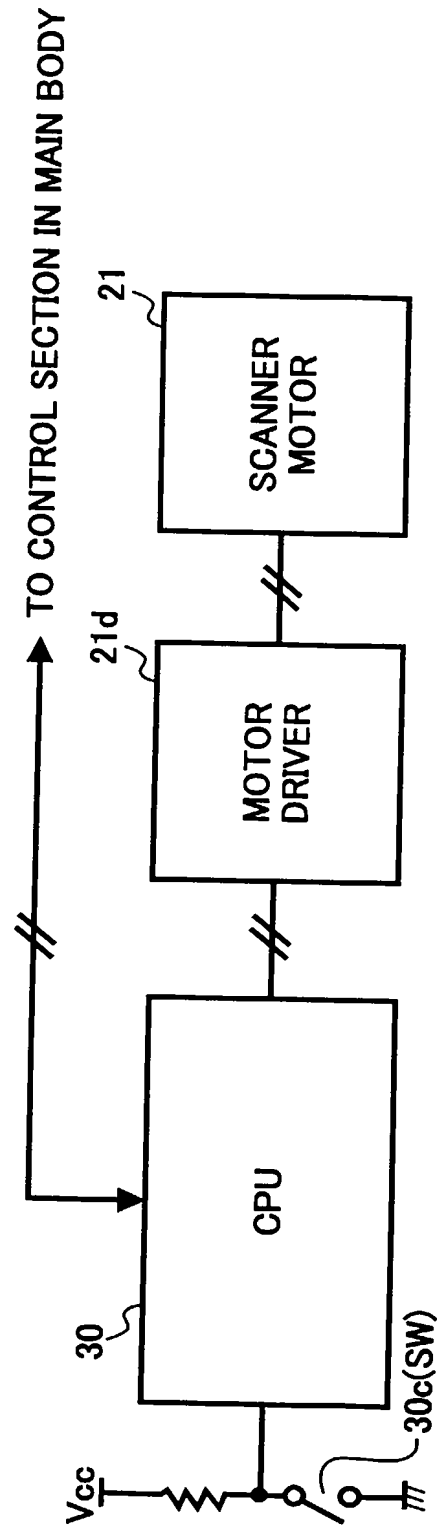


FIG. 8

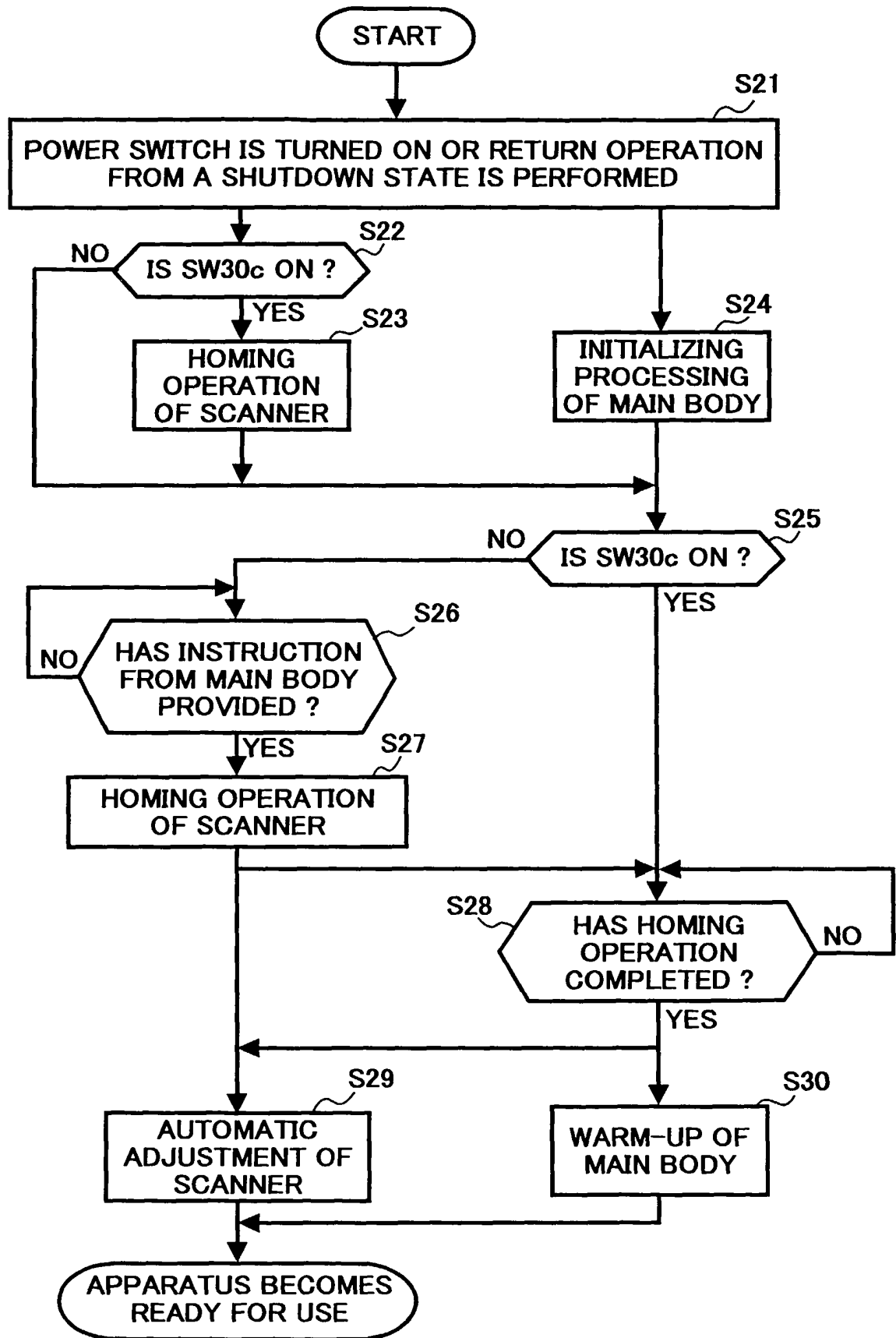


FIG. 9A WHEN SW30c IS ON

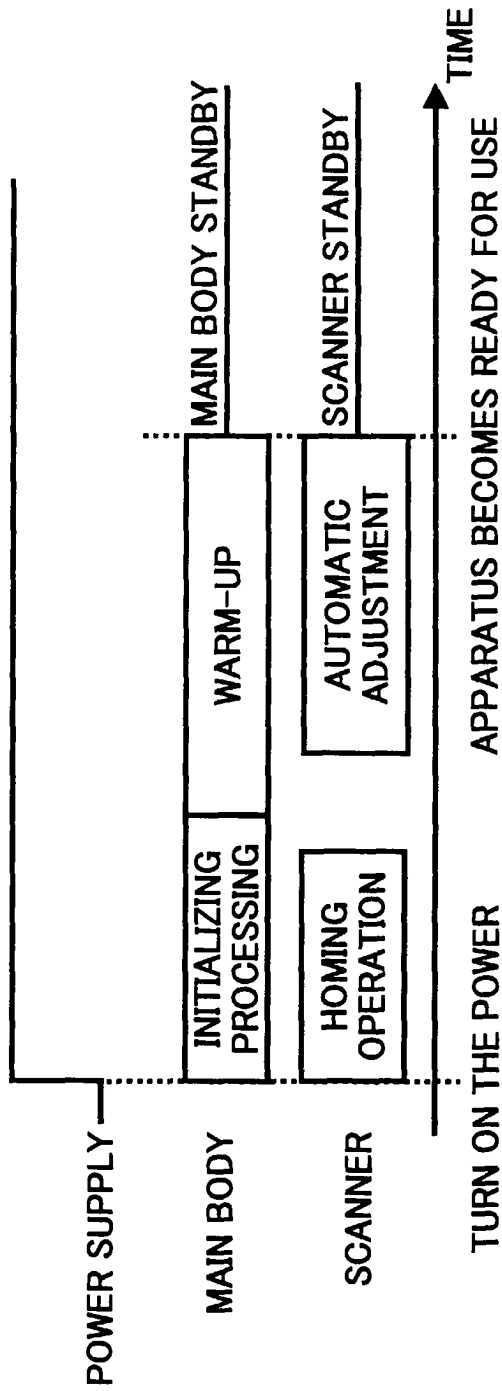


FIG. 9B WHEN SW30c IS OFF

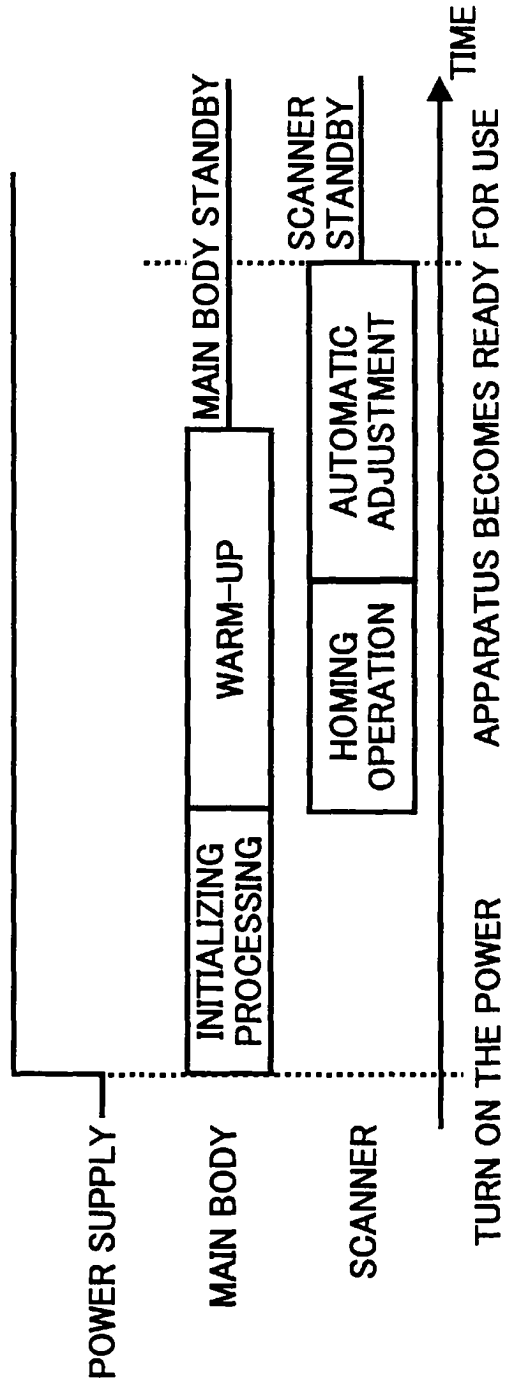


FIG. 10

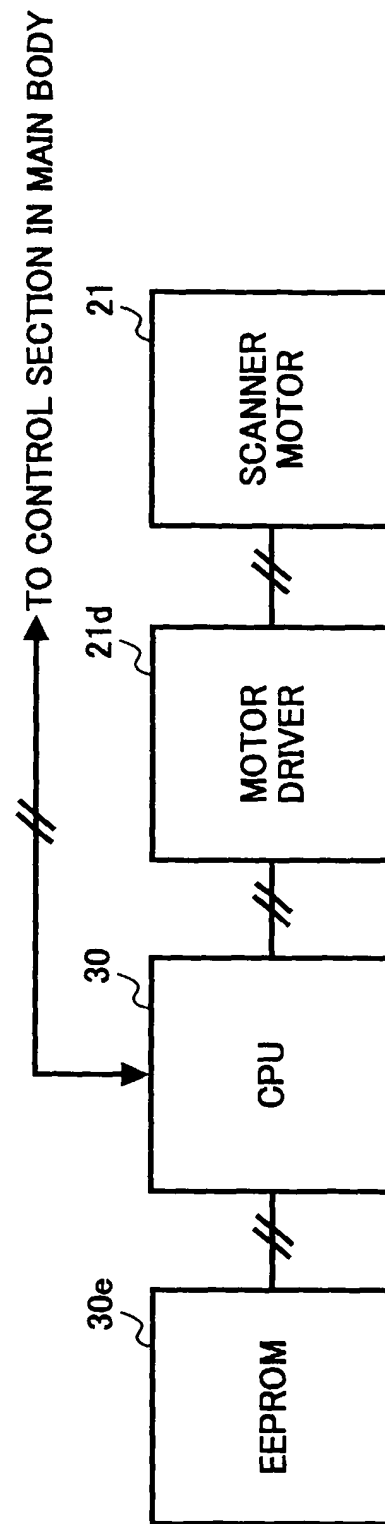


FIG. 11

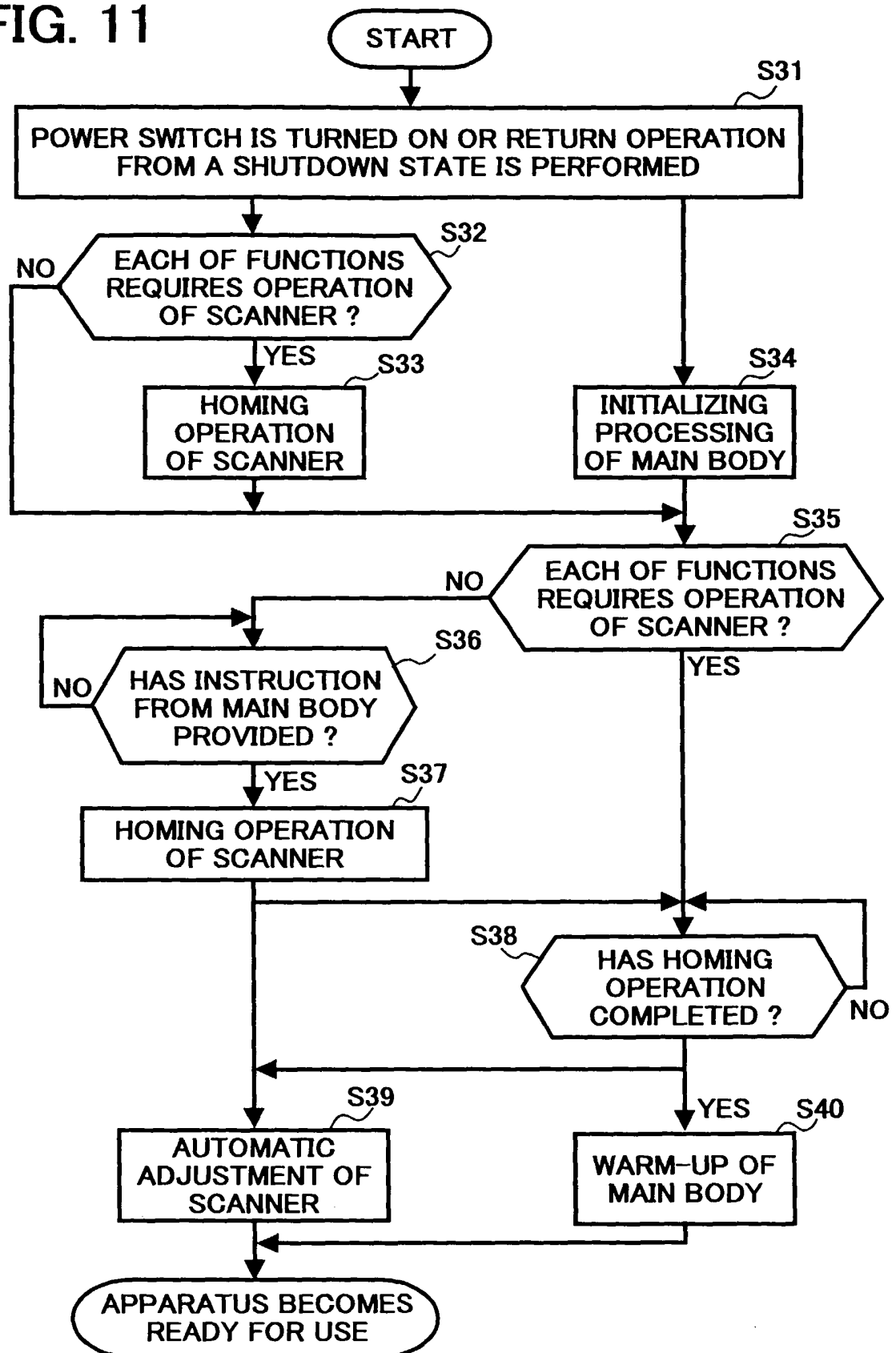


FIG. 12A

EACH OF FUNCTIONS REQUIRES OPERATION OF SCANNER

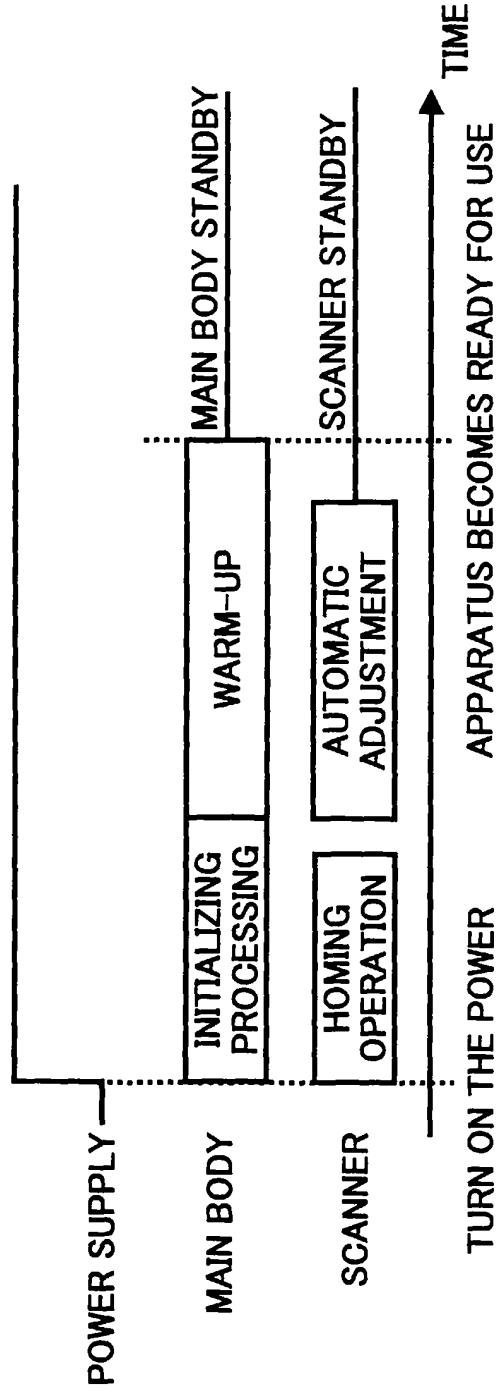


FIG. 12B

AT LEAST ONE OF FUNCTIONS DOES NOT REQUIRE OPERATION OF SCANNER

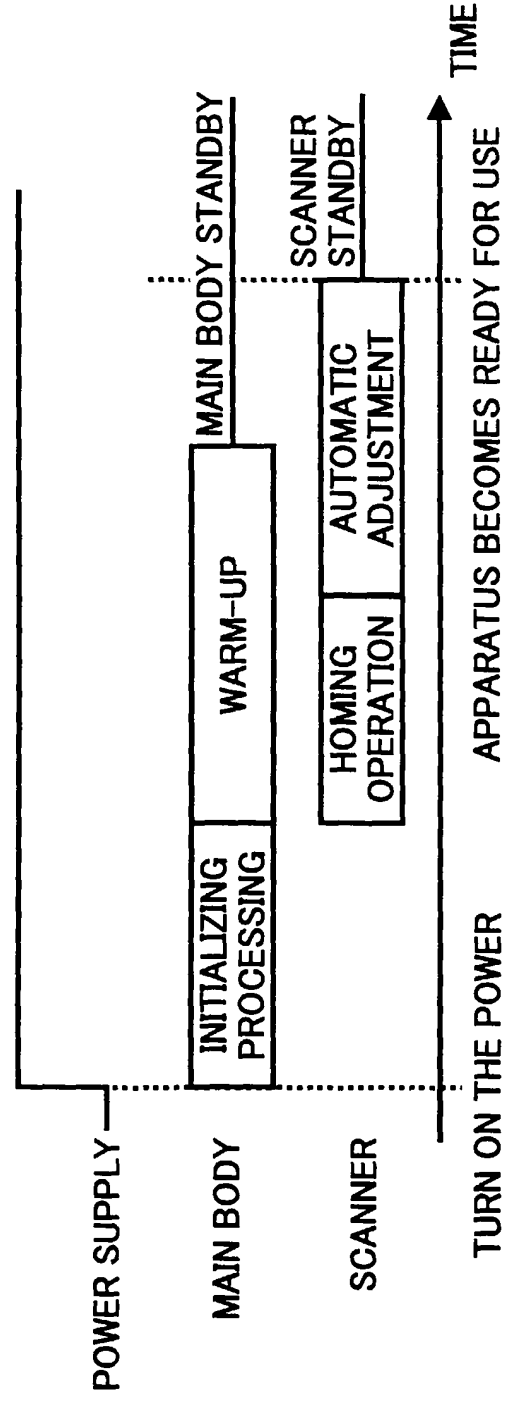


FIG. 13

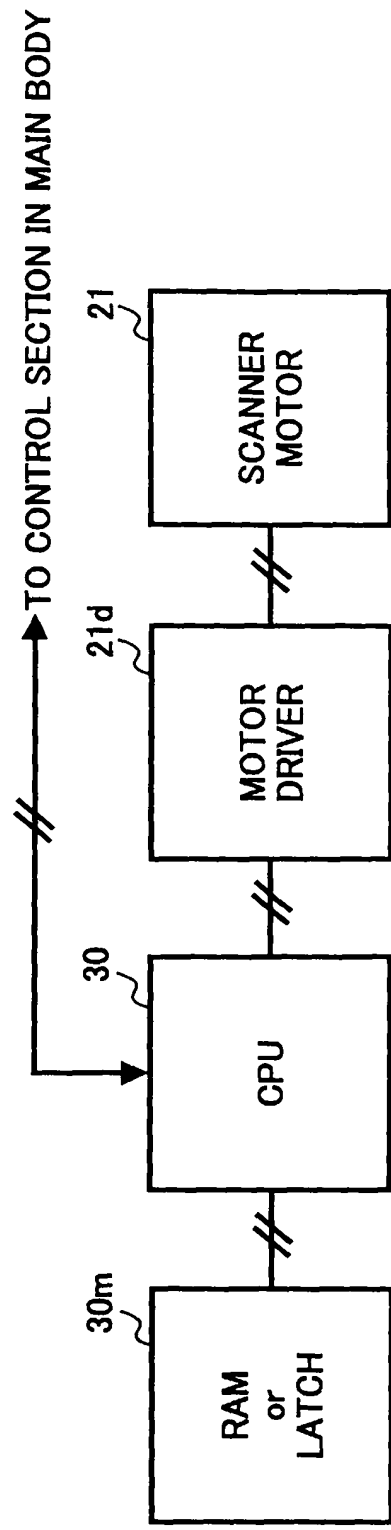


FIG. 14
PRIOR ART

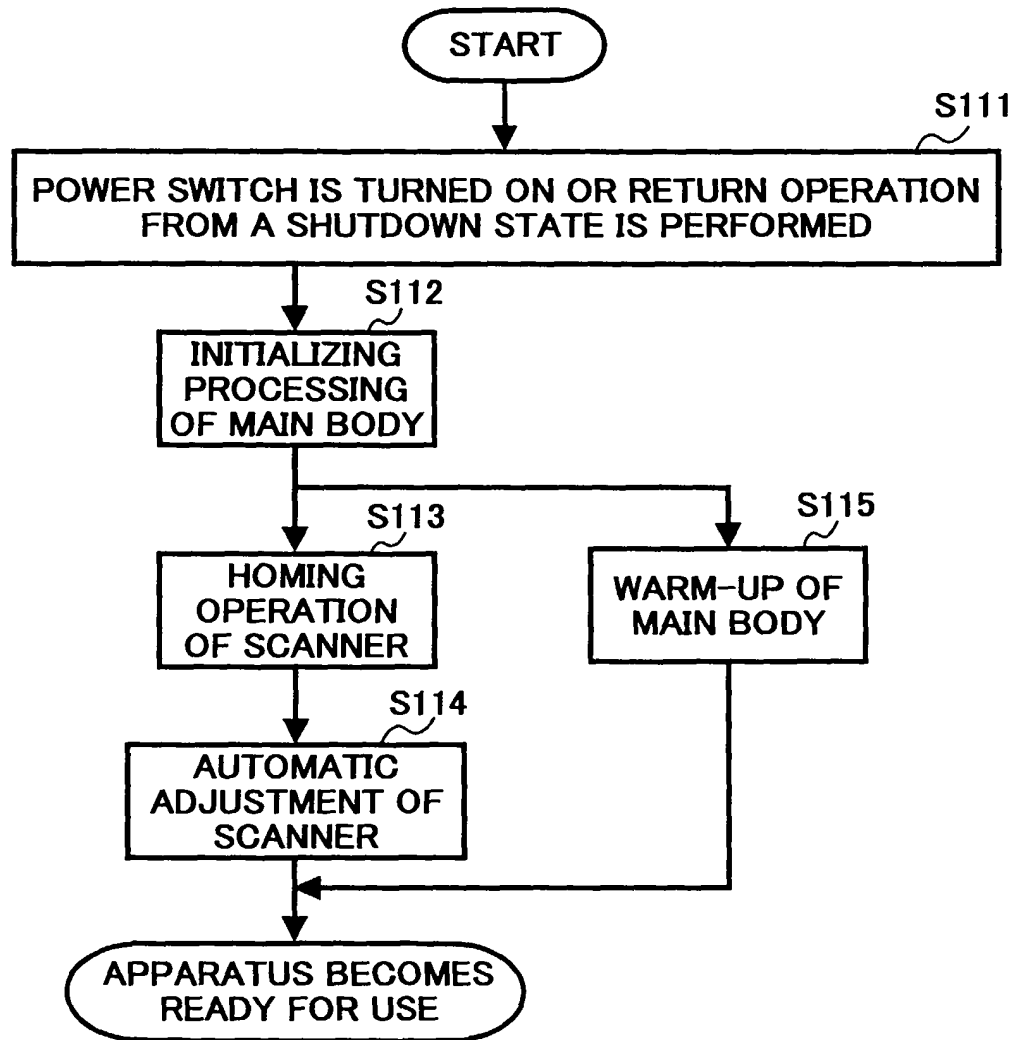


FIG. 15A PRIOR ART

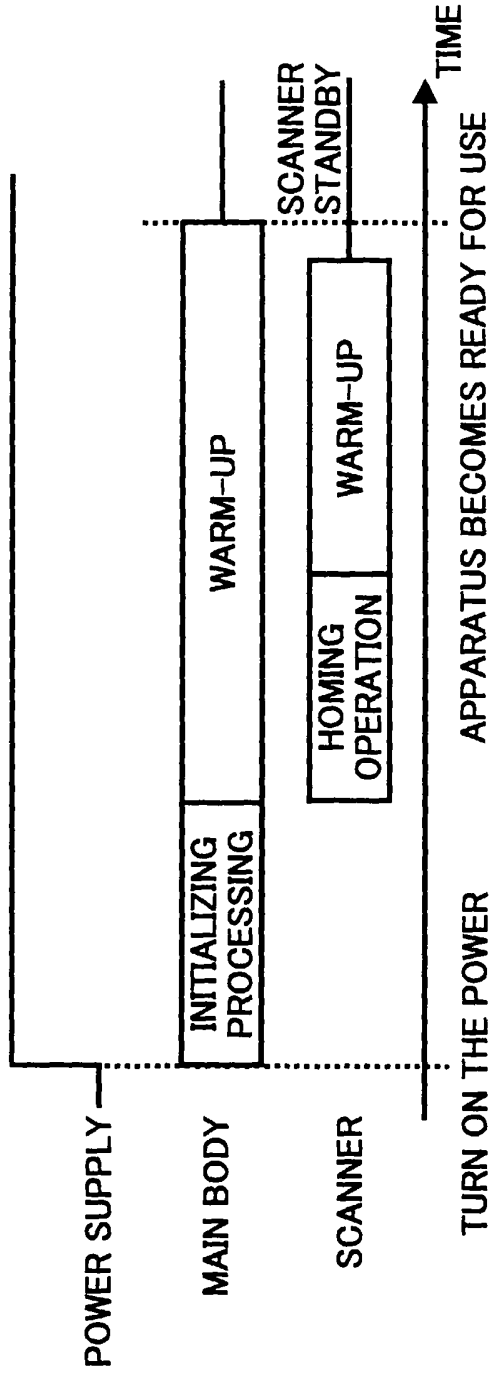
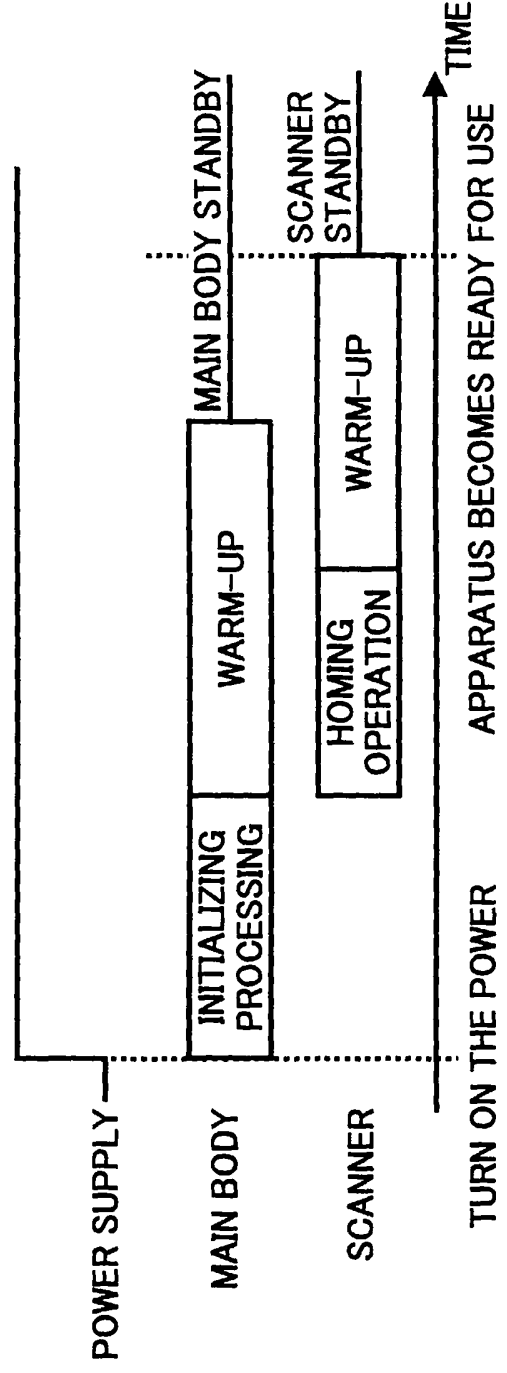


FIG. 15B PRIOR ART



WHAT IS CLAIMED IS:

1. A bearing structure for a drive mechanism comprising:

a first hole in a frame;

a bearing member that is fit into the first hole, the

5 bearing member having a second hole for inserting a drive shaft that is driven by a drive motor; and

a crimp provided between the bearing member and the first hole, which crimps the bearing member in the first hole.

10

2. The bearing structure according to claim 1, wherein the crimp is made of elastic material in the form of a thin sheet, wherein the crimp having

15 a third hole for inserting the bearing member and the drive shaft; and

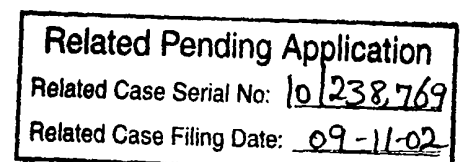
at least one interfering portion that interferes with the bearing member when the bearing member is inserted in the third hole.

20 3. The bearing structure according to claim 2, wherein there are two interfering portions and the interfering portions are provided symmetrically on opposite side with respect to the third hole.

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4. An image reader comprising:
a moving body fixed to two wires;
a drive shaft having two ends, one pulley provided
at each end, the wires being wound around the corresponding
5 pulleys,
a motor that drives the drive shaft to thereby realize
reciprocating motion of the moving body; and
a frame having two first holes, a bearing structure
being fitted into each first hole, each bearing structure
10 having
a bearing member that is fit into the
corresponding first hole, the bearing member having a second
hole for inserting the drive shaft; and
a crimp provided between the bearing member and
15 the first hole, which crimps the bearing member in the
corresponding first hole.

5. An image forming device comprising:
an image reader that scans a surface of a medium to
20 acquire image data of the surface; and
an image forming section that forms and prints an image
of the surface based on the image data acquired by the image
reader,
the image reader including
25 a moving body fixed to two wires;

a drive shaft having two ends, one pulley provided at each end, the wires being wound around the corresponding pulleys,

a motor that drives the drive shaft to thereby
5 realize reciprocating motion of the moving body; and

a frame having two first holes, a bearing structure being fitted into each first hole, each bearing structure having

a bearing member that is fit into the
10 corresponding first hole, the bearing member having a second hole for inserting the drive shaft; and

a crimp provided between the bearing member and the first hole, which crimps the bearing member in the corresponding first hole.

15

6. A bearing structure for a drive mechanism comprising:

a first hole in a frame;

a bearing means fit into the first hole, the bearing means having a second hole for inserting a drive shaft that
20 is driven by a drive motor; and

a crimp means provided between the bearing means and the first hole for crimping the bearing means in the first hole.

25

7. An image reader comprising:

a moving means, fixed to two wires, for holding optical components for scanning a surface of a medium;

a drive shaft having two ends, one rotating means
5 provided at each end, the wires being wound around the corresponding rotating means,

a driving means that drives the drive shaft to thereby realize reciprocating motion of the moving means; and

a frame means having two first holes, a bearing
10 structure being fitted into each first hole, each bearing structure having

a bearing means fit into the corresponding first hole, the bearing means having a second hole for inserting the drive shaft; and

15 a crimp means provided between the bearing means and the first hole for crimping the bearing means in the first hole.

8. An image reader comprising:

20 an image reading means that scans a surface of a medium to acquire image data of the surface; and

an image forming means that forms and prints an image of the surface based on the image data acquired by the image reading means,

25 the image reading means including

a moving means, fixed to two wires, for holding
optical components for scanning a surface of a medium;

a drive shaft having two ends, one rotating means
provided at each end, the wires being wound around the
5 corresponding rotating means,

a driving means that drives the drive shaft to
thereby realize reciprocating motion of the moving means;
and

a frame means having two first holes, a bearing
10 structure being fitted into each first hole, each bearing
structure having

a bearing means fit into the corresponding
first hole, the bearing means having a second hole for
inserting the drive shaft; and

15 a crimp means provided between the bearing
means and the first hole for crimping the bearing means in
the first hole.

ABSTRACT OF THE DISCLOSURE

A drive shaft, which is driven by a drive motor, is held firmly at two points by bearing structures. The bearing structure has a hole in which a bearing member is fit. The
5 bearing member has hole, which is concentric with respect to the hole in which the bearing member is fit. A crimp, which is made of elastic material, having interfering portions that interfere with the bearing member is provided between the bearing member and the hole in the bearing
10 structure in which the bearing member is fit.

FIG. 1

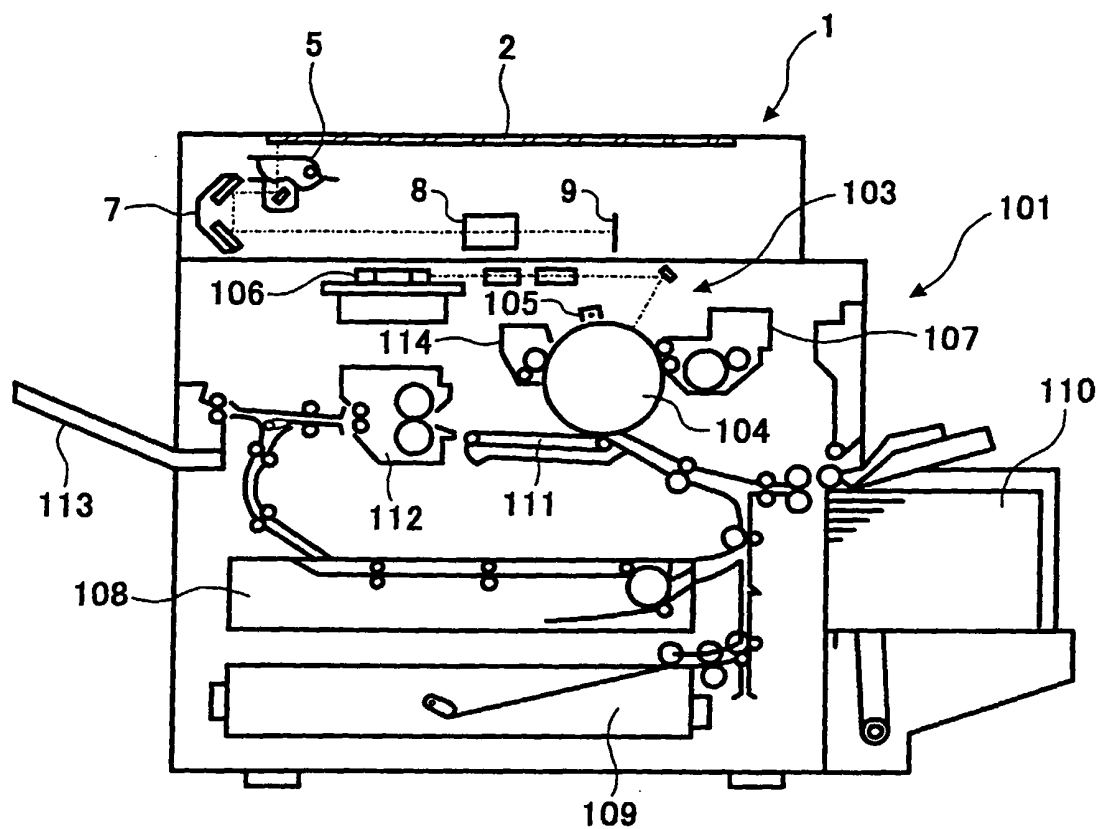


FIG. 2

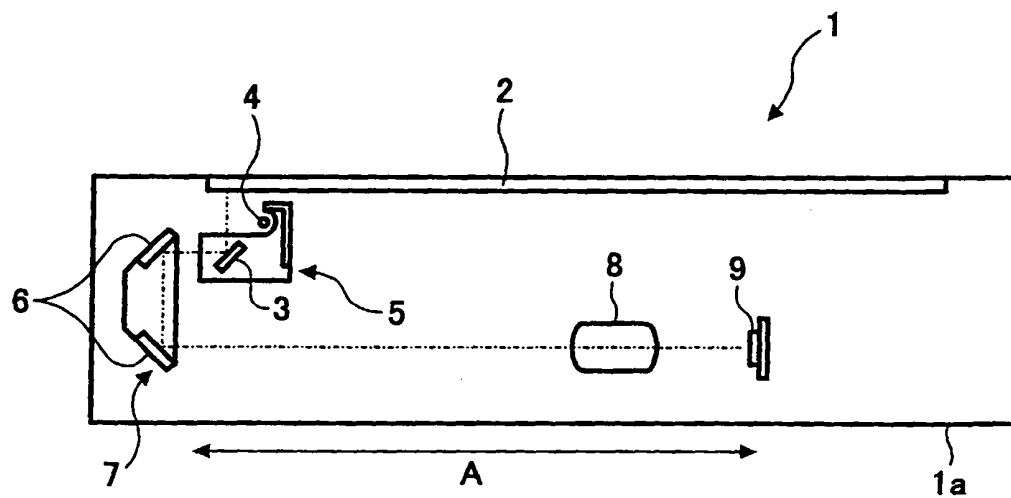


FIG. 3

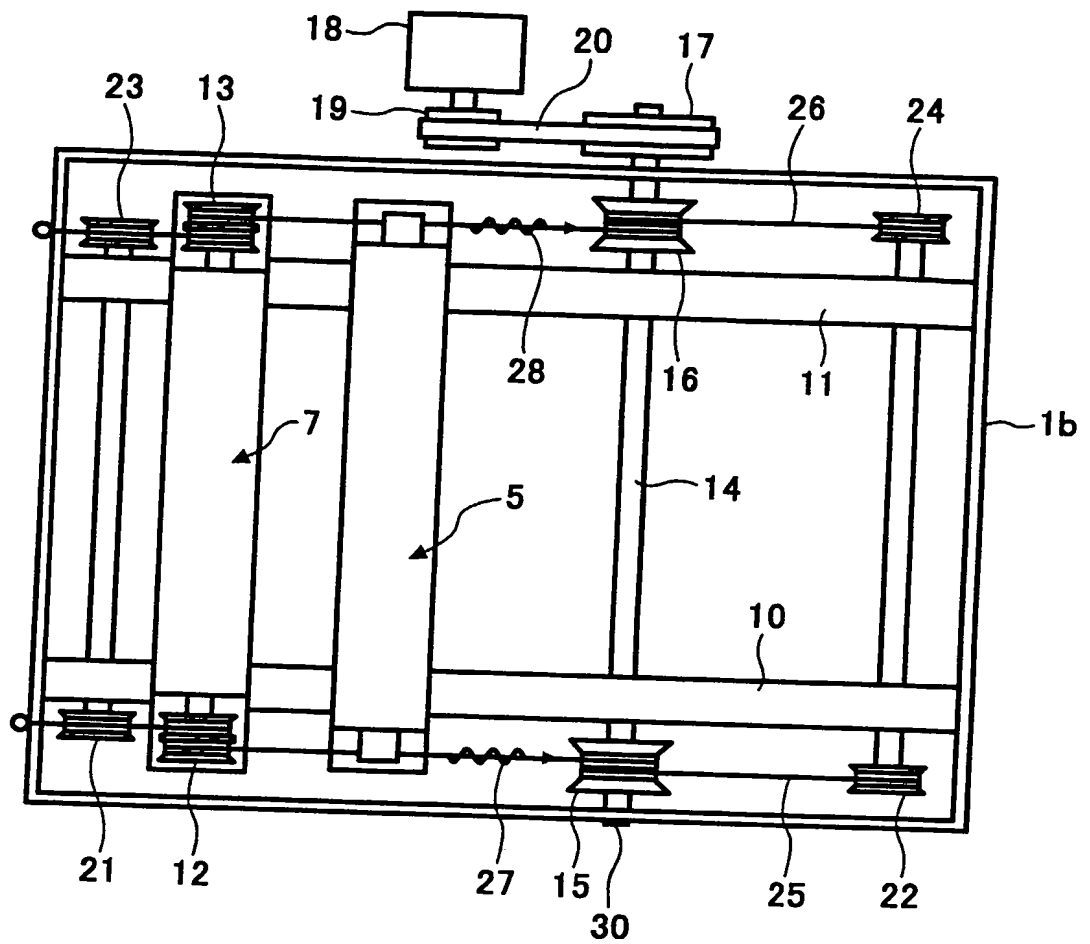


FIG. 4

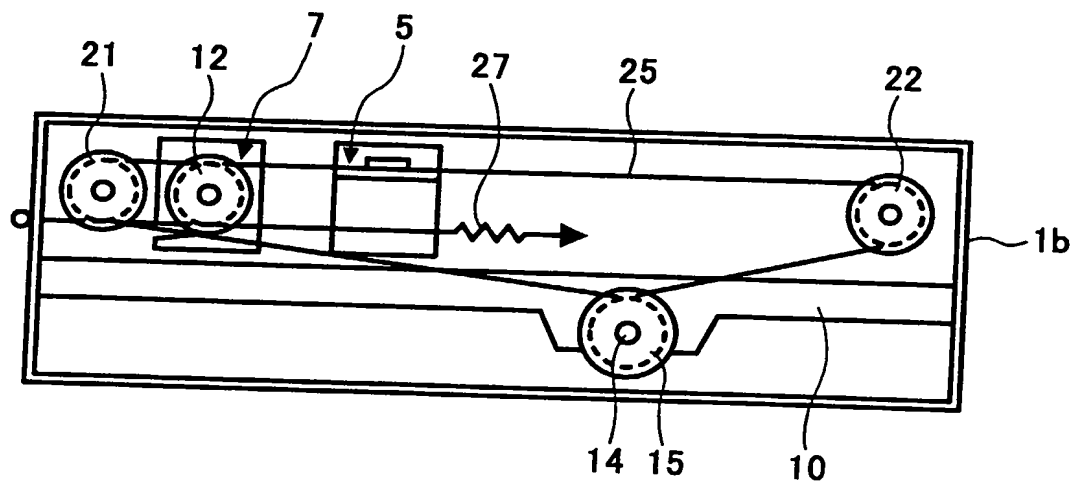


FIG. 5

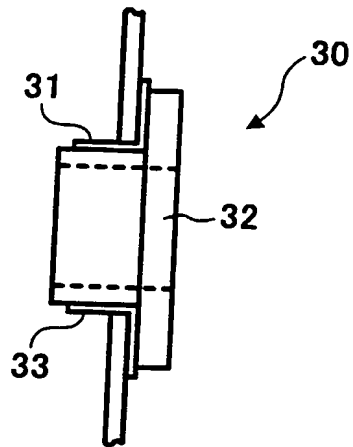


FIG. 6

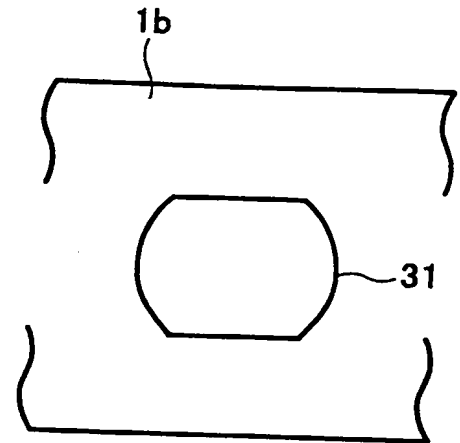


FIG. 7A

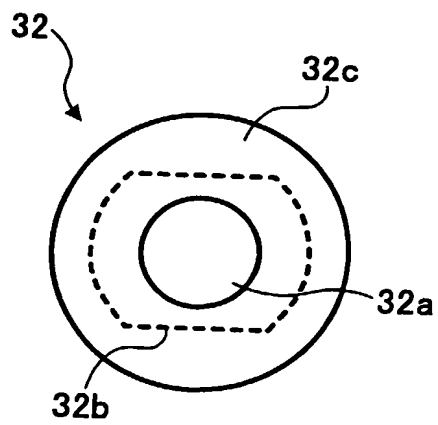


FIG. 7B

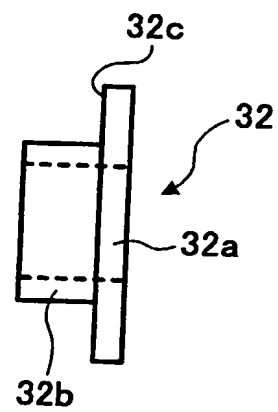


FIG. 8

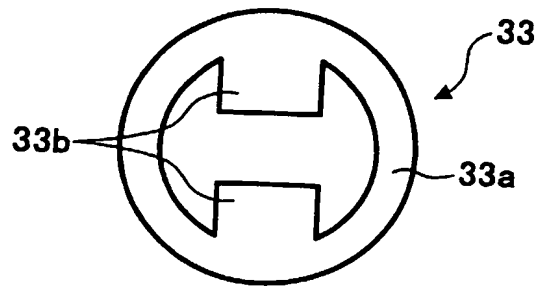


FIG. 9A

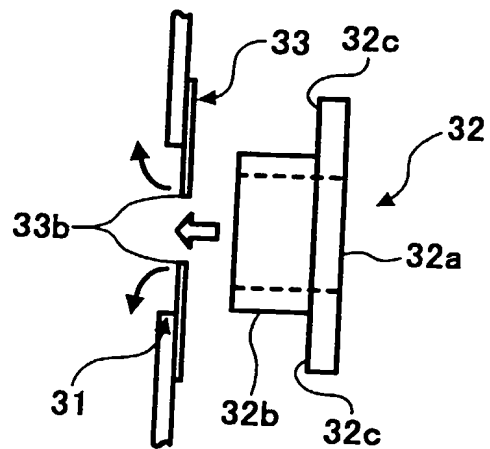


FIG. 9B

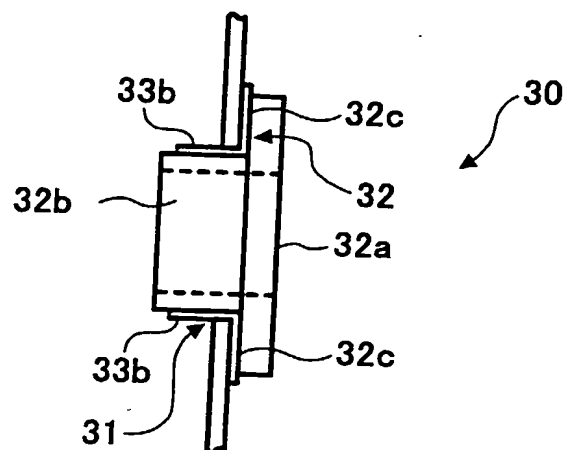


FIG. 10

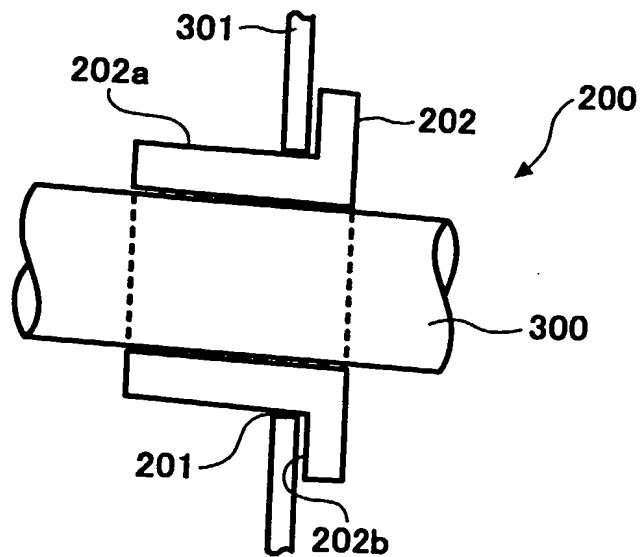


FIG. 11A

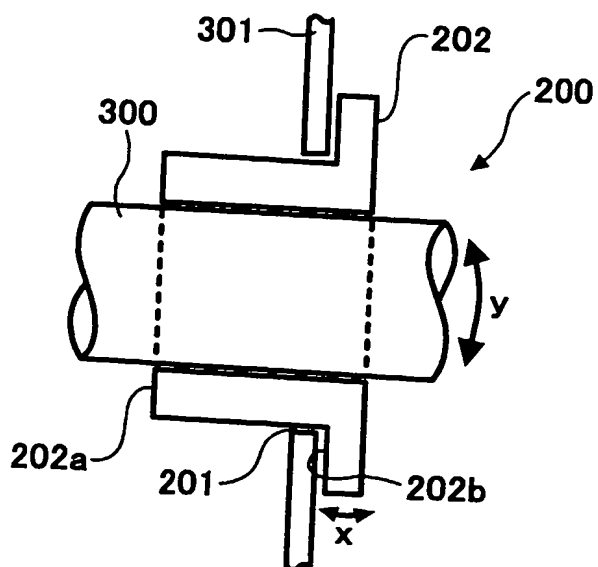
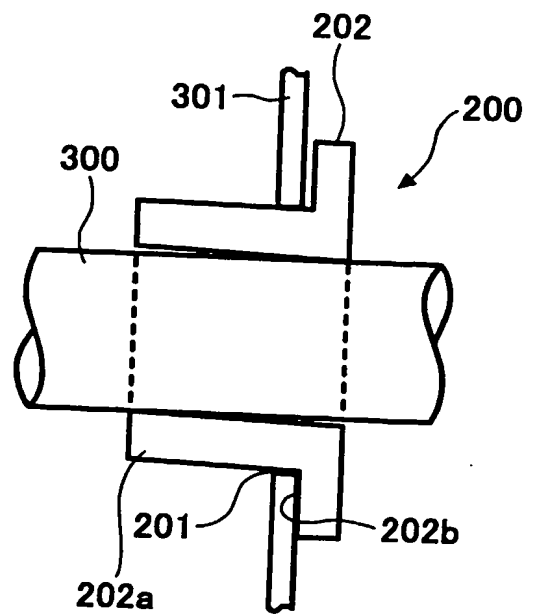


FIG. 11B

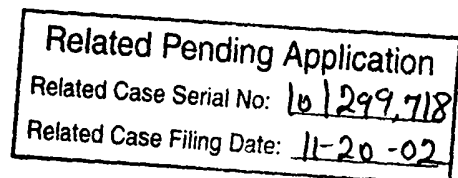


WHAT IS CLAIMED IS

5

1. An image forming apparatus, comprising:
 - a reading portion for reading an image by scanning an original document;
 - 10 driving means for driving the reading portion;
 - and
 - memory means for storing therein a plurality of driving frequencies for enabling the driving means to switch to a variety of speeds and drive in a step by
 - 15 step manner, and for storing therein a table indicative of a switching point for switching one driving frequency of the plurality of driving frequencies to another driving frequency of the plurality of driving frequencies,
 - 20 wherein one driving frequency of the plurality of driving frequencies is switched to another driving frequency of the plurality of driving frequencies at the switching point.

25



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2. The image reading apparatus as claimed in
5 claim 1, wherein the plurality of driving frequencies
include a low acceleration driving frequency and a high
acceleration driving frequency, wherein the high
acceleration driving frequency is switched to the low
acceleration driving frequency at the switching point.

10

15 3. The image reading apparatus as claimed in
claim 1, wherein the switching point is determined as a
point where a driving speed of the driving means reaches
a prescribed point, or as a prescribed elapsed time from
an initial drive of the driving means.

20

25 4. The image reading apparatus as claimed in

claim 1, wherein each driving frequency of the plurality of driving frequencies is predetermined according to a reading speed, wherein each driving frequency of the plurality of driving frequencies is
5 predetermined to enable the driving speed of the driving means to accelerate to the reading speed before the reading portion reaches an image reading area after the high acceleration driving frequency is switched to the low acceleration driving frequency at the switching
10 point, and wherein each driving frequency of the plurality of driving frequencies is predetermined to prevent the driving means from causing an overshoot.

15

5. The image reading apparatus as claimed in claim 1, wherein the driving means is decelerated with
20 reference to the switching point stored in the table.

25

6. The image reading apparatus as claimed in claim 1, further comprising speed selecting means for selecting a speed range from a plurality of speed ranges of the driving means, wherein the table stored in the
5 memory means is indicative of a plurality of switching points corresponding to the plurality of speed ranges, wherein each switching point of the plurality of switching points is designated to corresponding one of the plurality of speed ranges selected by the speed
10 selecting means.

15

7. An image forming apparatus, comprising:
a reading portion for reading an image by scanning an original document;
driving means for driving the reading portion;
20 memory means for storing therein a plurality of driving frequencies for enabling the driving means to switch to a variety of speeds and drive in a step by step manner; and
calculating means for determining a switching
25 point for switching one driving frequency of a plurality

of driving frequencies to another driving frequency of the plurality of driving frequencies by calculating a driving speed of the driving means in correspondence to a reading speed,

5 wherein one driving frequency of the plurality of driving frequencies is switched to another driving frequency of the plurality of driving frequencies at the switching point.

10

8. A method of accelerating the drive of a
15 reading portion of an image reading apparatus,
comprising the steps of:

 determining a reading speed of the reading
portion;

 determining a switching point; and

20 switchably driving the reading portion from
one driving frequency of a plurality of driving
frequencies to another driving frequency of the
plurality of driving frequencies, the driving frequency
serving to drive a driving means of the reading portion.

25

5 9. The method as claimed in claim 8, wherein
the switching point is determined by selecting the
switching point from a table.

10

 10. The method as claimed in claim 8, wherein
the switching point is determined by calculating the
15 switching point from a reading speed.

20

 11. An image forming apparatus, comprising:
 means for determining a reading speed of a
reading portion;
 means for determining a switching point; and
25 means for switchably driving the reading

portion from one driving frequency of a plurality of driving frequencies to another driving frequency of the plurality of driving frequencies.

5

12. An image forming apparatus, comprising:
- 10 a reading portion for reading an image by scanning an original document;
- a driving unit configured to drive the reading portion; and
- a memory unit configured to store a plurality
- 15 of driving frequencies for enabling the driving unit to switch to a variety of speeds and drive in a step by step manner, and for storing therein a table indicative of a switching point for switching one driving frequency of the plurality of driving frequencies to another
- 20 driving frequency of the plurality of driving frequencies,
- wherein one driving frequency of the plurality of driving frequencies is switched to another driving frequency of the plurality of driving frequencies at the
- 25 switching point.

5

13. The image reading apparatus as claimed in claim 12, further comprising a speed selecting unit configured to select a speed range from a plurality of speed ranges of the driving unit, wherein the table
10 stored in the memory unit is indicative of a plurality of switching points corresponding to the plurality of speed ranges, wherein each switching point of the plurality of switching points is designated to corresponding one of the plurality of speed ranges
15 selected by the speed selecting unit.

20

14. An image forming apparatus, comprising:
a reading portion for reading an image by scanning an original document;
a driving unit configured to drive the reading
25 portion;

a memory unit configured to store therein a plurality of driving frequencies for enabling the driving unit to switch to a variety of speeds and drive in a step by step manner; and

- 5 a calculating unit configured to determine a switching point for switching one driving frequency of a plurality of driving frequencies to another driving frequency of the plurality of driving frequencies by calculating a driving speed of the driving unit
- 10 corresponding to a reading speed,

wherein one driving frequency of the plurality of driving frequencies is switched to another driving frequency of the plurality of driving frequencies at the switching point.

ABSTRACT OF THE DISCLOSURE

This invention provides an image reading apparatus having high speed, small size and low cost, capable of reducing CPU load and capacity required for a memorizing table. The image forming apparatus including a reading portion for reading an image by scanning an original document, driving means for driving the reading portion, and memory means for storing therein a plurality of driving frequencies for enabling the driving means to switch to a variety of speeds and drive in a step by step manner, and for storing therein a table indicative of a switching point for switching one driving frequency of the plurality of driving frequencies to another driving frequency of the plurality of driving frequencies, wherein one driving frequency of the plurality of driving frequencies is switched to another driving frequency of the plurality of driving frequencies at the switching point.

FIG. 1

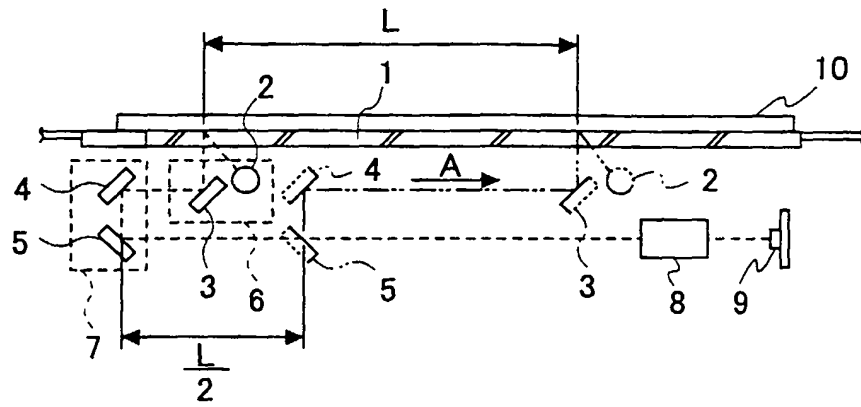


FIG.2

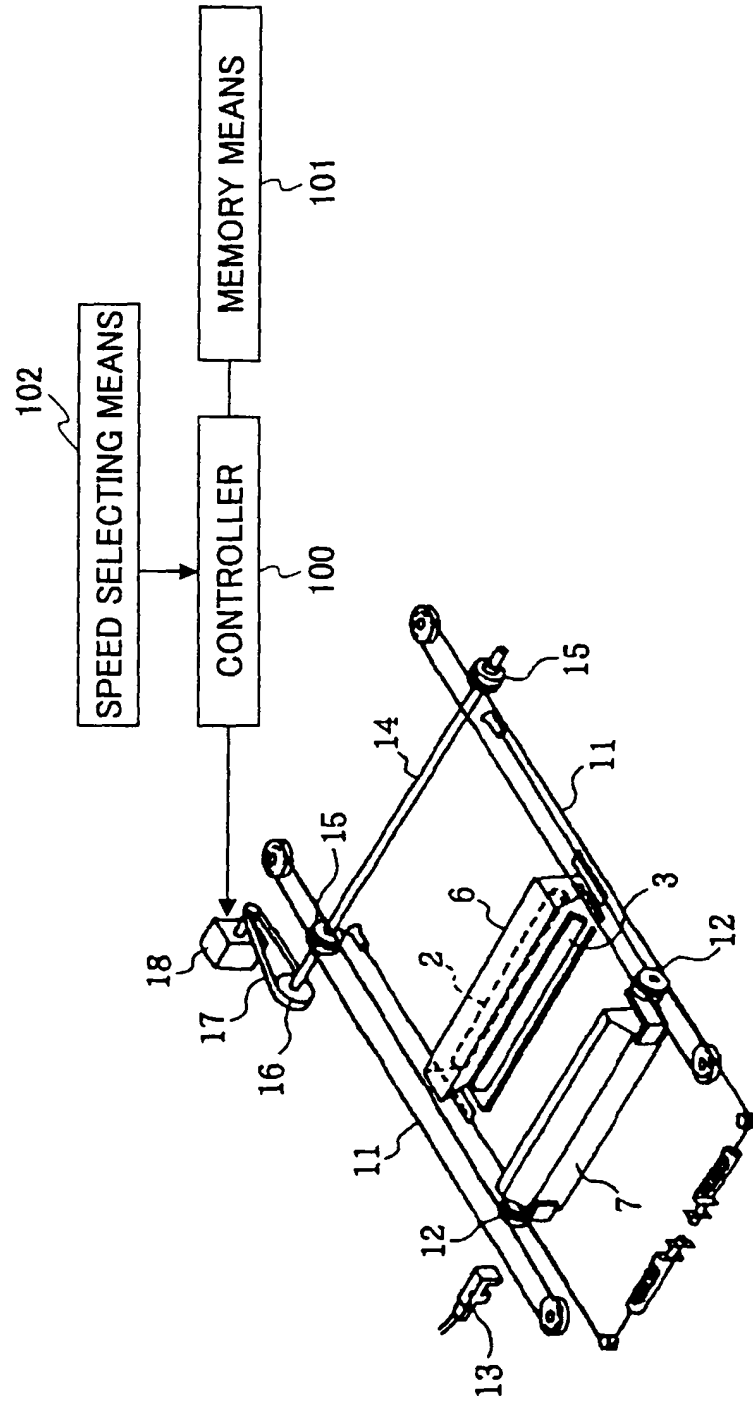
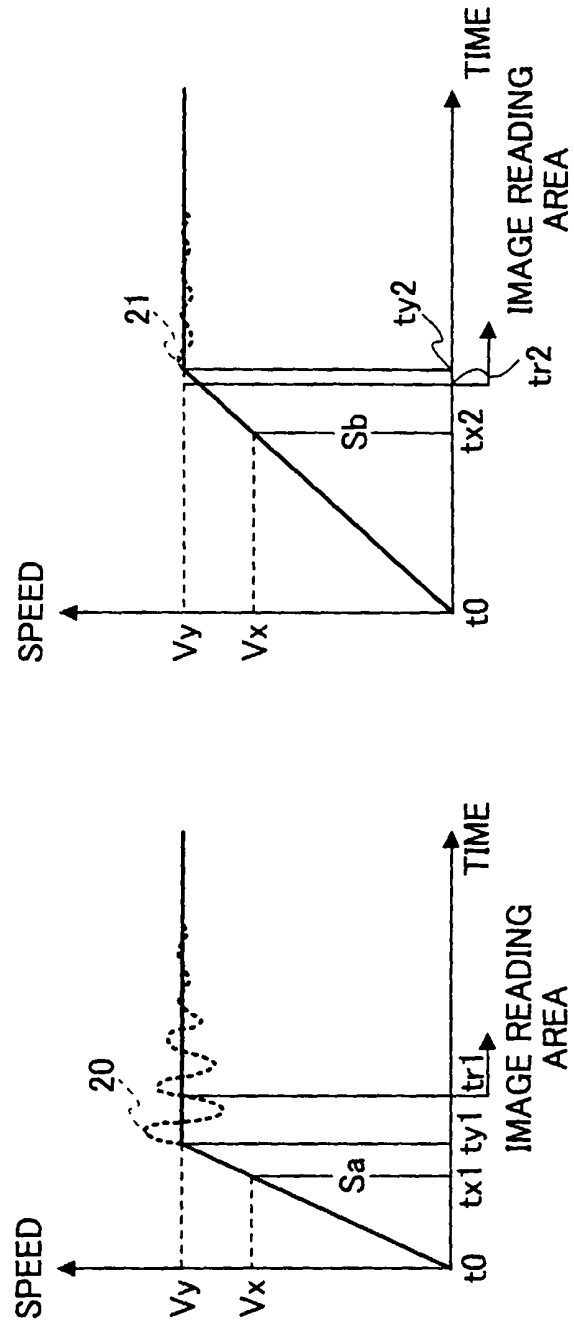


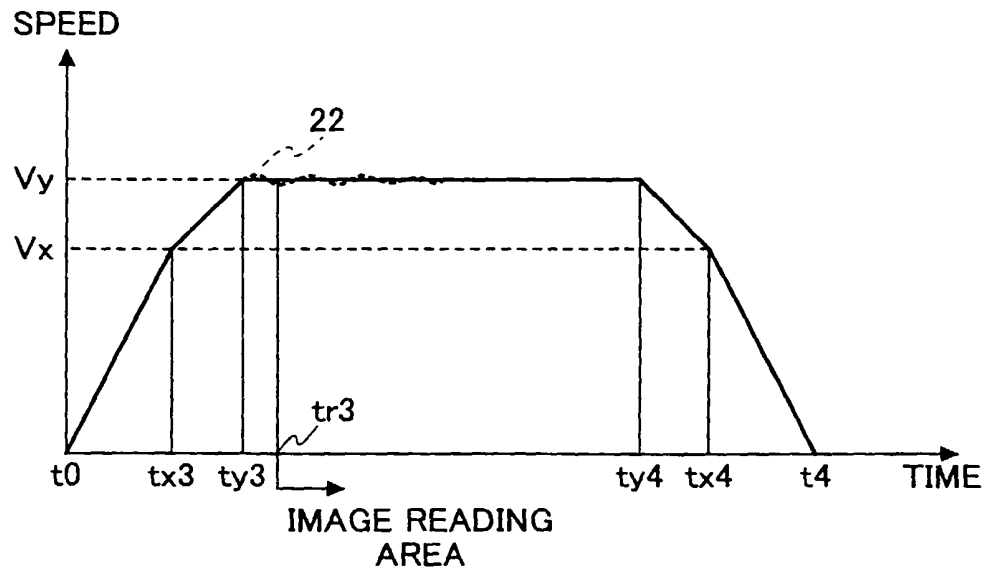
FIG.3



(a) HIGH ACCELERATION TABLE

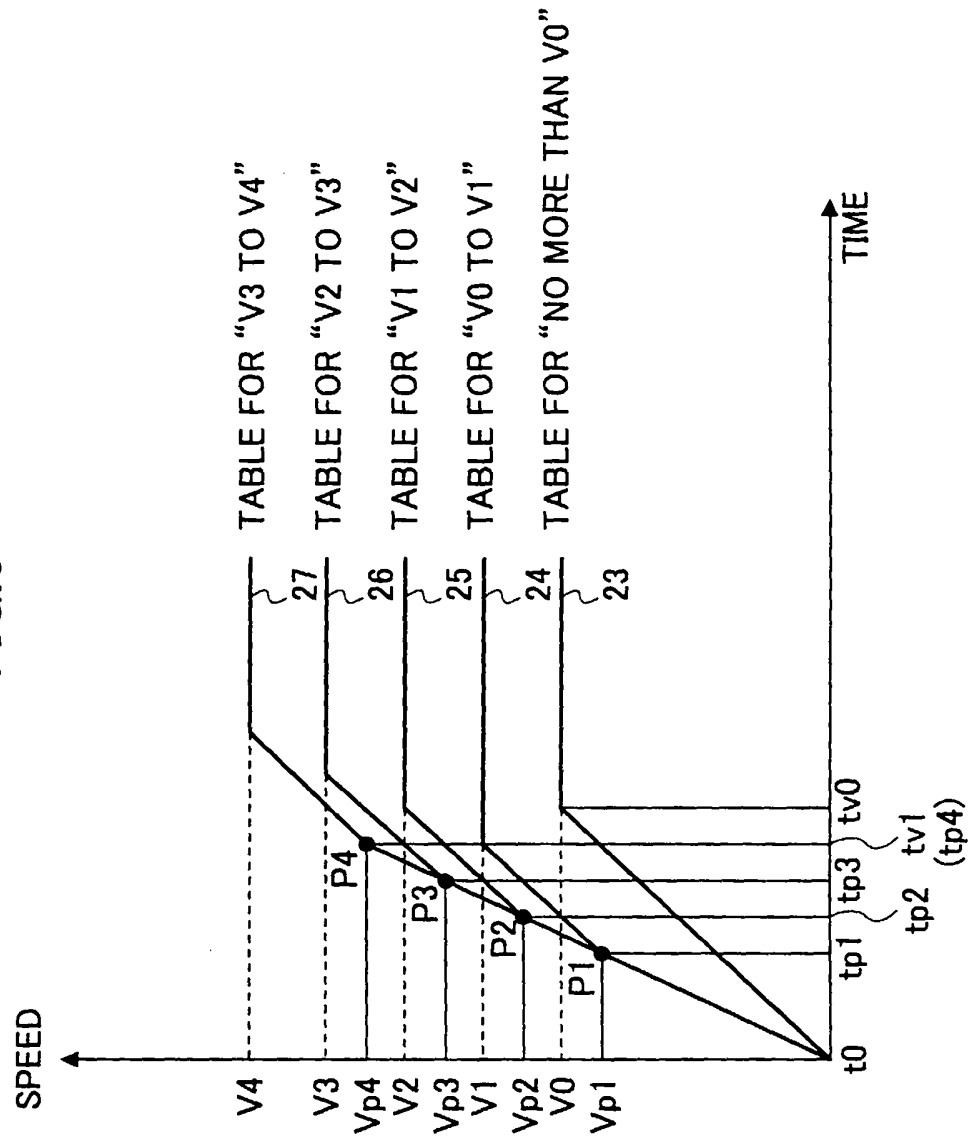
(b) LOW ACCELERATION TABLE

FIG.4



COMBINATION OF TABLES

FIG.5



ACCELERATION METHOD FOR EACH READING SPEED

FIG.6

EXAMPLE INDICATING
READING SPEEDS AND SWITCHING POINTS

28 SPEED RANGE	29 SWITCHING POINT	30 SPEED	31 TIME
MORE THAN 0 AND NO MORE THAN V0	NONE	V0	tv0
MORE THAN V0 AND NO MORE THAN V1	P1	Vp1	tp1
MORE THAN V1 AND NO MORE THAN V2	P2	Vp2	tp2
MORE THAN V2 AND NO MORE THAN V3	P3	Vp3	tp3
MORE THAN V3 AND NO MORE THAN V4	P4	Vp4	tp4